Environmental Science

COBALT AND CADMIUM ADSORPTION ONTO THE CELL SURFACES OF BACTERIA

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Previous work has suggested a universal edge for the adsorption of metals to the surface of various genera of bacteria. The adsorption of metals to bacterial surfaces in understanding the dynamics of metal movement and speciation in the subsurface environment. In these studies, we studied the binding of cobalt and cadmium to three different bacteria, *Bacillus subtilis, Pseudomonas fluorescens,* and *Shewanella oneidensis.* The bacteria were grown aerobically, centrifuged, washed, and resuspended in 0.1 M sodium perchlorate with a final concentration of 10 ppm metal solution. The pH of the solutions were adjusted and the suspensions were incubated for 2 hours. Adsorption of metal to cellular material was measured using inductively coupled plasma (ICP) analysis. Different parameters for each of the three bacteria were studied. Because previous experiments had shown cells were lysing during the binding assays, we added excess protein and DNAse in separate experiments. These macromolecules had no effect on metal binding, suggesting that we are measuring metal binding to the cell surface. Reversibility of binding was also tested as an additional control to our experimental procedures. Acidic standard metal solutions were used as the source of metal and neutral perchlorate solutions were used as the source of metal to test whether initial acidification had an effect on metal binding. The amount of bacterial growth was also examined to see if it affected binding. Preliminary results suggest that initial acidification changes the binding parameters for Gram negative bacteria, shifting the metal binding curve, independent of what phase of growth the bacterial are in at the time of the experiment. Further work is needed to determine the nature of the alteration being caused by initial low pH that was observed.

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